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Patentanwälte

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PCT chap. II

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Our Ref.: M/44212-PCT

Re.: **International Patent Application PCT/EP2003/007542**
De Nora Elettrodi S.p.A.

In response to the first written opinion of the IPEA dated March 26, 2004

1. Amended documents

Attached, a complete set of amended claims 1 - 20 is herewith submitted in triplicate to replace claims 1 - 21 as originally filed.

New claim 1, properly delimited over documents D1 and D1, comprises the features of original claims 1 and 7. For consistency of the terminology used, the term "hollow portion" in characterizing clause of original claim 1 has been changed to "hollow body" as used in the preamble of the claim.

Except for a renumbering and an adaptation of the claim references, new claims 7 - 20 correspond to original claims 8 - 21. Although objectable under Art. 6 PCT, original claim 21 (i.e. new claim 20) will be maintained for the time being.

Claims 1 – 6 remain unchanged.

2. Patentability of the amended set of claims

Applicant refers to Examiner's analysis under items 2.2) and 3) wherein the Examiner correctly acknowledges novelty and inventive step, respectively, of the subject matter of original claim 7 (now new claim 1).

As the electrolysis cell of new claim 17 refers to the patentable finger structure of new claim 1 and the process of new claim 18 likewise refers to the cell of new claim 17, said claims define patentable subject matter as well.

Thus, a favourable IPER (at least with respect to claims 1 - 19) is herewith solicited.

Should anything remain outstanding, the Examiner is invited to contact the undersigned for an informal (telephone) interview in accordance with Rule 66.6 PCT.

(J. Uwe Müller)

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enc.:
complete set of amended claims 1 - 20, in triplicate

CLAIMS

1. A cathodic finger structure for diaphragm electrolytic cell, comprising a hollow body defining an internal volume in fluid communication with a perimetrical chamber and delimited by a conductive surface provided with holes coated with a chemically inert porous diaphragm, said hollow body housing a reinforcing and electric current distributing internal element constituted by at least one sheet provided with projections, characterised in that said projections have a shape equivalent to spherical caps or elliptic caps or caps with prismatic sections.

2. The finger structure of claim 1, characterised in that the conductive surface provided with holes is an interwoven wire mesh or a perforated sheet.

3. The finger structure of anyone of claims 1 or 2 characterised in that said at least one sheet is a single sheet provided with projections on both its major surfaces.

4. The finger structure according to anyone of claims 1 to 3, characterised in that said sheet provided with projections is secured to said conductive surface by means of an electrically conductive connection.

5. The finger structure of claim 4, characterised in that said conductive connection is located on the apex of at least part of said projections.

6. The finger structure of anyone of claims 4 or 5, characterised in that said conductive connection establishes a plurality of generally equivalent ohmic paths for the uniform distribution of electric current.

7. The finger structure of anyone of claims 1 to 6, characterised in that said projections are arranged according to a square mesh pattern.

8. The finger structure of anyone of claims 1 to 6, characterised in that said projections are arranged according to a quincuncial pattern.

9. The finger structure of anyone of the preceding claims, characterised in that each vertical section of said at least one sheet comprises part of at least one of said projections.

10. The finger structure of anyone of claims 1 to 9, characterised in that the distance between the centres of two adjacent caps is comprised between 50 and 65 millimetres and the radii of extrados and intrados of said caps are comprised between 17 and 22 millimetres and between 12 and 16 millimetres respectively.

11. The finger structure of anyone of the preceding claims, characterised in that the thickness of said sheet is comprised between 5 and 7 millimetres.

12. The finger structure of anyone of the preceding claims, characterised in that said internal volume defined by said hollow body is subdivided by said at least one sheet into two portions in fluid communication with said perimetrical chamber, and said portions are only partially occupied by said projections and are available for the natural internal recirculation of electrolytes.

13. The finger structure of anyone of the preceding claims, characterised in that said al least one sheet provided with projections is further provided with openings in the residual flat areas.

14. The finger structure of anyone of the preceding claims, characterised in that said projections are obtained by plastic deformation of said at least one sheet.

15. The finger of claims 1 to 13, characterised in that said projections are independent pieces secured onto said at least one sheet.

16. The finger according to claim 15, characterised in that said projections are secured onto said at least one sheet by welding or brazing.

17. An electrolysis cell comprising an anodic compartment and a cathodic compartment separated by an inert porous diaphragm, wherein said cathodic compartment consists of a perimetrical chamber provided with at least one nozzle in the bottom for discharging electrolytes and with at least one nozzle in the top for gas outlet, and of a plurality of cathodic fingers according to anyone of the preceding claims electrically connected to said perimetrical chamber.

18. A process of chlor-alkali electrolysis, which comprises feeding a sodium chloride solution to the anodic compartment of the cell of claim 17, applying electric current and discharging a solution of caustic soda and depleted sodium chloride formed inside said internal volume of said plurality of cathodic fingers through said nozzle for discharging electrolytes and a hydrogen flow through said nozzle for gas outlet.

19. The process of claim18 characterised in that said hydrogen has free ascensional motion inside the internal volume of said plurality of cathodic fingers and free longitudinal motion towards said perimetrical chamber, and in that said solution of caustic soda and depleted sodium chloride has free recirculation in the internal volume of said plurality of cathodic fingers.

20. A cathodic finger for diaphragm electrolytic cell substantially as hereinbefore described with reference to the annexed figures.